WHAT IS CLAIMED IS:

1. A system for performing measurements over a network, the system comprising:

nodal members forming a nodal network between which one-way measurements are performed over asymmetrical paths, wherein the measurements are performed at the Internet Protocol layer, and wherein the number of nodal members in the nodal network is scaleable.

2. The system of Claim 1, wherein the nodal members are used as measurement points and have synchronized timing systems.

3. The system of Claim 2, wherein the nodal members support Network Time Protocol synchronization and Global Positioning System synchronization.

4. The system of Claim 1, wherein the one-way measurements performed by nodal members at the Internet Protocol layer provide cross application and cross platform comparable measurements.

5. The system of Claim 1, wherein the system utilizes a vector based measurement system to achieve service-based, comparable measurements.

6. The system of Claim 5, wherein the vector based measurement system defines a vector by an IP source, an IP destination, and service type.

7. The system of Claim 1, wherein the measurements performed between the nodal members are selected from a group consisting of code version, source identities, time parameters, sequence/byte/packet loss, out of order packets, error packet types, sequential packet loss, packet hop count, IP protocol tracking, packet TOS and DiffServ changes, packet jitter, one-way latency, outages, and route information.

8. The system of Claim 1, wherein the nodal members perform processing of measurement data.

9. The system of Claim 1, wherein the nodal members implement a processing algorithm on raw measurement data recorded for each measurement period, and wherein the processing algorithm compacts the raw measurement data.

10. The system of Claim 7, wherein the raw measurement data is compacted to approximately 1 kilobyte per five minute measurement period per vector.

11. The system of Claim 7, wherein distributed processing among the nodal members allows centralized processing of the raw measurement data to be eliminated.

12. The system of Claim 1, wherein the measurement system minimizes network traffic by utilizing the nodal members for distributed processing.

13. The system of Claim 1, wherein the measurement system eliminates single point failure by utilizing the nodal members for distributed processing.

14. The system of Claim 1, wherein the nodal members are true Internetworking devices, thereby supporting TCP/IP, SNMP, Telnet, TFTP, dhcp, BootP, RARP, DNS resolver, traceroute, and ping.

15. The system of Claim 1, wherein the nodal members include multiple on-board processors, enabling one processor to handle management processes and another processor to handle measurement processes.

16. The system of Claim 1, wherein each nodal member is capable of automatic software updating in synchronization with other nodal members in the nodal network for minimal loss of measurement time and enhanced scalability.

17. The system of Claim 1, wherein the nodal members are autonomous devices that are capable of generating measurement packets, performing one-way measurements at the Internet Protocol layer, processing measurement data, and temporary storing measurement data, despite a service daemon or database outage.

18. The system of Claim 17, wherein the nodal members are functional without requiring a TCP session with the service daemon.

19. The system of Claim 1, wherein the nodal members employ a dual power system to minimize power failures.

20. The system of Claim 1, wherein in response to a nodal member failure, the nodal member records the reason for the failure, and automatically reestablishes the nodal member to the nodal network upon resolution of the failure.

21. A method for performing measurements over a network, the method comprising:

performing one-way measurements between nodal members over asymmetrical paths, wherein the measurements are performed at the Internet Protocol layer in a scalable environment;

processing data produced from the one-way measurements between nodal members;

transmitting the processed measurement data from the nodal members to a database; and

analyzing the processed measurement data.

22. The method of Claim 21, wherein the performing of one-way measurements between nodal members is achieved by transmitting measurement packets with CQOS headers between nodal members.

23. The method of Claim 21, wherein the processing of the measurement data produced from the one-way measurements between nodal members compacts the measurement data.

24. The method of Claim 21, wherein the nodal members perform the processing of measurement data.

25. The method of Claim 21, wherein the nodal members implement a processing algorithm on raw measurement data recorded for each measurement period, and wherein the processing algorithm compacts the raw measurement data.

26. The method of Claim 25, wherein the raw measurement data is compacted to approximately 1 kilobyte per five minute measurement period per vector.

27. The method of Claim 25, wherein distributed processing among the nodal members allows centralized processing of the raw measurement data to be eliminated.

28. The method of Claim 21, wherein the nodal members are used as measurement points and have synchronized timing systems.

29. The method of Claim 28, wherein the nodal members support Network Time Protocol synchronization and Global Positioning System synchronization.

30. The method of Claim 21, wherein the measurements performed between the nodal members are selected from a group consisting of code version, source identities, time parameters, sequence/byte/packet loss, out of order packets, error packet types, sequential packet loss, packet hop count, IP protocol tracking, packet TOS and DiffServ changes, packet jitter, one-way latency, outages, and route information.

31. The method of Claim 21, wherein network traffic is minimized by utilizing the nodal members for distributed processing.

32. The method of Claim 21, wherein single point failure is eliminated by utilizing the nodal members for distributed processing.

33. The method of Claim 21, wherein the nodal members are true Internetworking devices, thereby supporting TCP/IP, SNMP, Telnet, TFTP, dhcp, BootP, RARP, DNS resolver, trace route, and ping.

34. The method of Claim 21, wherein the nodal members include multiple on-board processors, enabling one processor to handle management processes and another processor to handle measurement processes.

35. The method of Claim 21, wherein each nodal member is capable of automatic software updating in synchronization with other nodal members in the nodal network for minimal loss of measurement time and enhanced scalability.

36. The method of Claim 21, wherein the nodal members are autonomous devices that are capable of generating measurement packets, performing one-way measurements at the Internet Protocol layer, processing measurement data, and temporary storing measurement data, despite a service daemon or database outage.

37. The method of Claim 21, wherein the nodal members are functional without requiring a TCP session with the service daemon.

38. The method of Claim 21, wherein the nodal members employ a dual power system to minimize power failures.

39. The method of Claim 21, wherein, in response to a nodal member failure, the failed nodal member records the reason for the failure, and automatically reestablishes the nodal member to the nodal network upon resolution of the failure.

40. A system for performing measurements over a network, the system comprising:

a nodal network that includes multiple nodal members between which one-way measurements are performed over asymmetrical paths, wherein the measurements are performed at the Internet Protocol layer, and wherein the number of nodal members used as measurement points in the nodal network is scaleable;

a database, wherein the database stores measurement data recorded by the nodal members;

a workstation operatively associated with the database, wherein the workstation facilitates system configuration and reporting of measurement data; and

at least one service daemon, and wherein the service daemon interfaces with the nodal network and the database, instructs the nodal members to create vectors, obtains vector configuration information from the database, and processes results data transmitted from the nodal members to the database.

41. The system of Claim 40, further comprising an application server that interfaces between the workstation and the database for system configuration and results display.

42. The system of Claim 40, wherein the service daemon performs automatic error recovery to retrieve missing measurement data when measurement data is lost in transmission.

43. The system of Claim 40, wherein the nodal members continue to perform measurements and store measurement data in response to a service daemon failure until a replacement service daemon is activated.

44. The system of Claim 40, wherein the workstation includes a user interface, and wherein the system performs measurements and stores measurement data without dependence on the user interface.

45. The system of Claim 40, wherein the workstation includes a user interface that is alterable without modifying underlying system architecture.

46. The system of Claim 40, wherein the workstation utilizes a browser based interface to provide system reports and management functions to a user from any computer connected to the Internet without requiring specific hardware or software.

47. The system of Claim 40, wherein the system implements an access protocol that is selectively configurable to allow third party applications to access the system.

48. The system of Claim 40, wherein the workstation utilizes multiple levels of access rights, wherein administrator level access rights allow system configuration including creation/modification/deletion of nodal members, vectors, service types, logical groups of vectors, and user access lists, and wherein user level access rights allow only report viewing.

49. The system of Claim 40, wherein CQOS protocol is a non-processor intensive, non-bandwidth intensive protocol for transmitting processed, compacted measurement data.

50. The system of Claim 40, wherein measurement data from each measurement period is sent from the nodal members to the database via CQOS protocol.

51. The system of Claim 40, wherein the nodal members communicate with each other using CQOS protocol.

52. The system of Claim 40, wherein the database is SQL compliant, and stores vector configuration information and results measurement data to allow generation of true averages in response to user defined parameters.

53. The system of Claim 40, wherein the data stored in the database is selected from the group consisting of: code version; nodal member ID; vector ID; measurement period ID; universal time; length of measurement period; number of packets and bytes sent and received in the measurement sequence; anomalies, including out of order, duplicated, fragmented, dropped, IP-corrupted, payload-corrupted, CQOS information corrupted; TTL changes, TOS changes, minimum/maximum/average/standard deviation for one-way latency and jitter, and route information.

54. The system of Claim 40, wherein the one-way measurements performed by nodal members at the Internet Protocol layer provide cross application and cross platform comparable measurements.

55. The system of Claim 40, wherein the system utilizes a vector based measurement system to achieve service-based, comparable measurements.

56. The system of Claim 55, wherein the vector based measurement system defines a vector by an IP source, an IP destination, and service type.

57. The system of Claim 55, wherein vectors in the vector based measurement system are capable of disablement without deletion from the database.

58. The system of Claim 40, wherein the nodal members implement hardware time stamping.

59. The system of Claim 58, wherein the hardware time stamping offloads the processor-intensive activity of time stamping to free up processing power.

60. The system of Claim 58, wherein each nodal member includes an output buffer, and wherein during the hardware time stamping process, header information and data information fill the output buffer before a time stamp is applied to the output buffer.

61. The system of Claim 40, wherein the system provides user-definable groupings of vectors for facilitating vector display and reporting.

62. The system of Claim 40, wherein nodal members in the nodal network are capable of user-defined, customizable groupings for area-specific measurement reporting.

63. The system of Claim 40, wherein the customizable groupings of nodal members are capable of overlapping each other.

64. The system of Claim 40, wherein measurement reports generated by the system are producible in both standard formats and customized formats.

65. The system of Claim 40, wherein the system utilizes a measurement packet having a format that includes Ethernet header, IP header, optional IP routing options, UDP/TCP header, payload, and CQOS header.

66. The system of Claim 65, wherein checksums are calculated on the measurement packets for payload, IP header, UDP/TCP header, and CQOS header.

67. The system of Claim 40, wherein the system facilitates user-definable bandwidth allocation for measurement traffic.

68. The system of Claim 40, wherein each nodal member automatically calculates a rate at which measurement packets are generated, such rate based upon the number of vectors, packet size, and bandwidth allocation.

69. The system of Claim 40, wherein the system performs highly accurate measurements at a high sampling rate.

70. A method for performing measurements over a network, the method comprising:

performing one-way measurements between nodal members over asymmetrical paths, wherein the measurements are performed at the Internet Protocol layer in a scalable environment;

processing data in the nodal members produced by the one-way measurements between nodal members;

transmitting the processed measurement data from the nodal members to a database via at least one service daemon that interfaces with the nodal network and the database, wherein the at least one service daemon instructs the nodal members to create vectors, obtains vector configuration information from the database, and processes results data transmitted from the nodal members to the database; and

providing for system management capabilities and measurement data analysis via the workstation.

71. The method of Claim 70, further comprising an application server that interfaces between the workstation and the database for system configuration and results display.

72. The method of Claim 70, wherein the service daemon performs automatic error recovery to retrieve missing measurement data when measurement data is lost in transmission.

73. The method of Claim 70, wherein the nodal members continue to perform measurements and store measurement data in response to a service daemon failure until a replacement service daemon is activated.

74. The method of Claim 70, wherein the workstation includes a user interface, and wherein the system performs measurements and stores measurement data without dependence on the user interface.

75. The method of Claim 70, wherein the workstation includes a user interface that is alterable without modifying underlying system architecture.

76. The method of Claim 70, wherein the workstation utilizes a browser based interface to provide system reports and management functions to a user from any computer connected to the Internet without requiring specific hardware or software.

77. The method of Claim 70, wherein the system implements an access protocol that is selectively configurable to allow third party applications to access the system.

78. The method of Claim 70, wherein the workstation utilizes multiple levels of access rights, wherein administrator level access rights allow system configuration including creation/modification/deletion of nodal members, vectors, service types, logical groups of vectors, and user access lists, and wherein user level access rights allow only report viewing.

79. The method of Claim 70, wherein CQOS protocol is a non-processor intensive, non-bandwidth intensive protocol for transmitting processed, compacted measurement data.

80. The method of Claim 70, wherein measurement data from each measurement period is sent from the nodal members to the database via CQOS protocol.

81. The method of Claim 70, wherein the nodal members communicate with each other using cQOS protocol.

82. The method of Claim 70, wherein the database is SQL compliant, and stores vector configuration information and results measurement data to allow generation of true averages in response to user defined parameters.

83. The method of Claim 70, wherein the data stored in the database is selected from the group consisting of: code version; nodal member ID; vector ID; measurement period ID; universal time; length of measurement period; number of packets and bytes sent and received in the measurement sequence; anomalies, including out of order, duplicated, fragmented, dropped, IP-corrupted, payload-corrupted, CQOS information corrupted; TTL changes, TOS changes, minimum/maximum/average/standard deviation for one-way latency and jitter, and route information.

84. The method of Claim 70, wherein the one-way measurements performed by nodal members at the Internet Protocol layer provide cross application and cross platform comparable measurements.

85. The method of Claim 70, wherein the system utilizes a vector based measurement system to achieve service-based, comparable measurements.

86. The method of Claim 85, wherein the vector based measurement system defines a vector by an IP source, an IP destination, and service type.

87. The method of Claim 85, wherein vectors in the vector based measurement system are capable of disablement without deletion from the database.

88. The method of Claim 70, wherein the nodal members implement hardware time stamping.

89. The method of Claim 88, wherein the hardware time stamping offloads the processor-intensive activity of time stamping to free up processing power.

90. The method of Claim 89, wherein each nodal member includes an output buffer, and wherein during the hardware time stamping process, header information and data information fill the output buffer before a time stamp is applied to the output buffer.

91. The method of Claim 70, wherein the system provides user-definable groupings of vectors for facilitating vector display and reporting.

92. The method of Claim 70, wherein nodal members in the nodal network are capable of user-defined, customizable groupings for area-specific measurement reporting.

93. The method of Claim 70, wherein the customizable groupings of nodal members are capable of overlapping each other.

94. The method of Claim 70, wherein measurement reports generated by the system are producible in both standard formats and customized formats.

95. The method of Claim 70, wherein the system utilizes a measurement packet having a format that includes Ethernet header, IP header, optional IP routing options, UDP/TCP header, payload, and CQOS header.

96. The method of Claim 95, wherein checksums are calculated on the measurement packets for payload, IP header, UDP/TCP header, and CQOS header.

97. The method of Claim 70, wherein the system facilitates user-definable bandwidth allocation for measurement traffic.

98. The method of Claim 70, wherein each nodal member automatically calculates a rate at which measurement packets are generated, such rate based upon the number of vectors, packet size, and bandwidth allocation.

99. The method of Claim 70, wherein the system performs highly accurate measurements at a high sampling rate.

100. A system for performing network measurements utilizing a readiness test, the system comprising:

a nodal network that includes multiple nodal members between which one-way measurements are performed at the Internet Protocol layer;

a measurement database;

a workstation, wherein the workstation provides a user interface for system configuration and reporting of measurement data;

an application server, wherein the application server interfaces between the database and the workstation for system configuration and results display; and

a service daemon, wherein the service daemon interfaces the nodal network and the database;

wherein a transmitting nodal member performs a readiness test to ensure the willingness of a receiving nodal member to accept measurement traffic before the transmitting nodal member begins to transmit measurement traffic to the receiving nodal member.

101. The system of Claim 100, wherein the readiness test comprises:

broadcasting an Address Resolution Protocol request to a gateway/local host in order to obtain its physical hardware address;

pinging the gateway/local host;

pinging the receiving nodal member;

performing a traceroute to the receiving nodal member; and

performing a Go/No Go test using a CQOS protocol, wherein the CQOS protocol is a non-processor intensive, non-bandwidth intensive protocol for nodal members to communicate with each other.

102. The system of Claim 101, wherein the Go/No Go test is performed by a transmitting nodal member requesting and obtaining permission from a receiving device to transmit measurement traffic before the transmitting nodal member transmits the measurement traffic,

thereby ensuring protection against unwanted measurements being made on nodal members and against measurement traffic being sent to a non-nodal member receiving device.

103. The system of Claim 100, wherein the readiness test verifies linkage and reachability of nodal members before measurements are performed without creating unnecessary duplication of effort in the network.

104. A system for performing measurements over a network, the system comprising:

nodal members forming a nodal network between which one-way measurements are performed at the Internet Protocol layer providing cross application and cross platform comparable measurements, and wherein the number of nodal members in the nodal network is scaleable.

105. The system of Claim 104, wherein the system utilizes a vector based measurement system to achieve service-based, comparable measurements.

106. The system of Claim 105, wherein the vector based measurement system defines a vector by an IP source, an IP destination, and service type.

107. A system for performing measurements over a network, the system comprising:

nodal members forming a nodal network between which one-way measurements are performed at the Internet Protocol layer, wherein the nodal members perform processing of measurement data, and wherein the number of nodal members in the nodal network is scaleable.

108. The system of Claim 107, wherein the nodal members implement a processing algorithm on raw measurement data recorded for each measurement period, and wherein the processing algorithm compacts the raw measurement data.

109. The system of Claim 108, wherein the raw measurement data is compacted to approximately 1 kilobyte per five minute measurement period per vector.

110. The system of Claim 109, wherein distributed processing among the nodal members allows centralized processing of the raw measurement data to be eliminated.

111. The system of Claim 107, wherein the measurement system minimizes network traffic by utilizing the nodal members for distributed processing.

112. The system of Claim 107, wherein the measurement system eliminates single point failure by utilizing the nodal members for distributed processing.

113. A system for performing measurements over a network, the system comprising:

nodal members forming a nodal network between which one-way measurements are performed over asymmetrical paths, wherein the nodal members are autonomous devices that are capable of generating measurement packets, performing one-way measurements at the Internet Protocol layer, processing measurement data, and temporarily storing measurement data, despite a service daemon or database outage.

114. The system of Claim 113, wherein the nodal members are functional without requiring a TCP session with the service daemon.

115. A system for performing measurements over a network, the system comprising:

a nodal network that includes multiple nodal members between which one-way measurements are performed at the Internet Protocol layer;

a database, wherein the database stores measurement data;

a workstation, wherein the workstation provides a user interface for system configuration and reporting of measurement data, wherein the workstation utilizes a browser based interface to provide system reports and management functions to a user from any computer connected to the Internet; and

an application server, wherein the application server interfaces between the database and the workstation for system configuration and results display; and

at least one service daemon, and wherein the service daemon interfaces with the nodal network and the database, instructs the nodal members to create vectors, obtains vector configuration information from the database, and processes results data transmitted from the nodal members to the database.

116. A system for performing measurements over a network, the system comprising:

a nodal network that includes multiple nodal members between which one-way measurements are performed at the Internet Protocol layer, wherein the nodal members communicate with each other using a CQOS protocol which is a non-processor intensive, non-bandwidth intensive protocol for transmitting processed, compacted measurement data;

a database, wherein the database stores measurement data;

a workstation, wherein the workstation provides a user interface for system configuration and reporting of measurement data;

an application server, wherein the application server interfaces between the database and the workstation for system configuration and results display; and

at least one service daemon, and wherein the service daemon interfaces with the nodal network and the database, instructs the nodal members to create vectors, obtains vector

configuration information from the database, and processes results data transmitted from the nodal members to the database.

117. The system of Claim 116, wherein measurement data from each measurement period is sent from the nodal members to the database via the CQOS protocol.

118. A system for performing measurements over a network, the system comprising:

a nodal network that includes multiple nodal members between which one-way measurements are performed at the Internet Protocol layer, and wherein the nodal members implement hardware time stamping, thereby offloading the processor-intensive activity of time stamping and freeing up processing power;

a database, wherein the database storing measurement data;

a workstation, wherein the workstation provides a user interface for system configuration and reporting of measurement data;

an application server, wherein the application server interfaces between the database and the workstation for system configuration and results display; and

at least one service daemon, and wherein the service daemon interfaces with the nodal network and the database, instructs the nodal members to create vectors, obtains vector configuration information from the database, and processes results data transmitted from the nodal members to the database.

119. The system of Claim 118, wherein each nodal member includes an output buffer, and wherein during the hardware time stamping process, header information and data information fill the output buffer before a time stamp is applied to the output buffer.

120. A system for performing measurements over a network, the system comprising:

a nodal network that includes multiple nodal members between which one-way measurements are performed at the Internet Protocol layer, wherein the number of nodal members used as measurement points in the nodal network is scaleable, and wherein the nodal members utilizes measurement packets that have a format which includes Ethernet header, IP header, optional IP routing options, UDP/TCP header, payload, and CQOS header;

a database, wherein the database stores measurement data recorded by the nodal members;

a workstation, wherein the workstation provides a user interface for system configuration and reporting of measurement data;

an application server, wherein the application server interfaces between the database and the workstation for system configuration and results display; and

at least one service daemon, wherein the service daemon interfaces with the nodal network and the database, instructs the nodal members to create vectors, obtains vector configuration information from the database, and processes results data transmitted from the nodal members to the database.

121. A system for performing measurements over a network, the system comprising:

a nodal network that includes multiple nodal members between which one-way measurements are performed at the Internet Protocol layer through the generation of measurement traffic, and wherein the system implements user-definable bandwidth allocation for measurement traffic;

a database, wherein the database stores measurement data recorded by the nodal members;

a workstation, wherein the workstation provides a user interface for system configuration and reporting of measurement data;

an application server, wherein the application server interfaces between the database and the workstation for system configuration and results display; and

at least one service daemon, wherein the service daemon interfaces with the nodal network and the database, instructs the nodal members to create vectors, obtains vector configuration information from the database, and processes results data transmitted from the nodal members to the database.

122. The system of Claim 121, wherein the system facilitates user-definable bandwidth allocation for measurement traffic.